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surveying and mapping have gone on rapidly under the supervision of the United States Geological Survey, and at the expense of the Federal Government. Of course, this work is not done alone in response to the influence of gold and silver; but the distribution of the work both in Alaska and in the States shows how influential have been the mineral deposits in determining the areas to be surveyed first. Gold and silver have played an important part, as have other minerals.

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TURNING KERGUELEN ISLAND TO ACCOUNT

The perseverance and energy of two brothers, René E. and Henri Bossière,* are at last calling attention to Kerguelen Island as a land that may possibly be developed and settled. This island, in the southern part of the Indian Ocean (49° S.; 70° E.), about midway between Australia and Africa, has not been regarded as offering inducements to enterprise. About 300 islands form the group, most of them very small, or mere rocks, but Kerguelen is said to have an area of over 1,200,000 acres, much of it covered with mountains, but with numerous valleys, abundantly watered and covered with grasses in summer.

This view of the island is quite recent. In fact one of the latest gazetteers speaks of Kerguelen as "sterile or covered with moss." In 1890, the under-Secretary of State for the French Colonies published a work entitled "*Les Colonies Françaises*," in which it was said that it was not absolutely impossible to settle in Kerguelen, but the island was so far from all maritime routes that it had no interest for colonists. It was discovered in 1772 by the French mariner Kerguelen, who did not land, but hurried back to France to report that he had seen the great southern continent. When France found, two years later, that the continent was merely a small archipelago, without a tree, Kerguelen was thrown into prison, where he spent four

* The enterprise of the Bossière brothers is described in *La Géographie* (July, 1909), *Bull. Soc. de Géog. Comm. de Paris* (January, 1910), *Bull. de la Soc. de Géog. de Lille* (March, 1910), and *Bull. de la Soc. de Géog. Comm. de Bordeaux* (June, 1910).

years. Captain Cook visited Kerguelen, a few years later, and the name he gave to the island, the Land of Desolation, has often been applied to it to this day. The island was also visited by the British explorer Ross, and various scientific expeditions, including the Gauss Antarctic party. Kerguelen, deeply cut by many inlets, is now very well mapped.

The French Government paid no attention to its remote possession; and even French maps printed British names of bays and capes, though French nomenclature has been applied to these features by the earlier explorers. The name of Kerguelen was unknown to most persons when René Bossière made the island the subject of his first pamphlet. His brother and he had never visited Kerguelen, but they had spent the years of 1881 and 1883 in southern Patagonia and were surprised to find the conditions there so favorable for the development of sheep raising. Several millions of sheep are now grazing on the pasturage of that south land and the neighboring plains of northern Tierra del Fuego, which, a generation ago, it was thought could never be turned to good account.

One day the brothers read a geographical account of Kerguelen and were impressed with the reported similarity between the climatic conditions of that island and southern Patagonia. They then made a study of the scanty literature on Kerguelen and it seemed to them that here was a French possession which might be turned to some usefulness. The more they thought of it, the more the idea absorbed them. The French newspapers gave space to their communications, their pamphlets were widely distributed and France began to hear the name of Kerguelen. The brothers at last asked the French Government what financial aid it would accord them if they should occupy the island in its name. The reply was that the Government could give no financial aid, but the enterprise would have its recognition and moral support. They would have to carry on the work at their own risk and cost. On these conditions, a decree was issued in 1893, conceding to the Bossière brothers the exploitation of Kerguelen Island and all the accruing profit for a term of fifty years.

The elder brother is a ship-owner, and his father was the last Frenchman engaged in the whaling industry, which has not attracted any French capital since 1863. The brothers believed, from all they heard, not only that sheep-growing might be made profitable in Kerguelen, but also that whaling and sealing in the neighboring waters would add greatly to the prospects of their enterprise.

Having obtained their concession, Mr. René Bossière went to

Patagonia to make a thorough study of the methods of sheep-farming there, while his brother finally enlisted the interest of a number of French capitalists who, in 1900, agreed to give the enterprise financial support to the amount of \$150,000. The services of Captain de Gerlache, the well-known Belgian Antarctic explorer, were secured to lead the first expedition to Kerguelen, and he set out with two small vessels expecting to pick up René Bossière at Magellan Strait. That gentleman waited at the Strait for three months, only to learn, at last, that de Gerlache had put back to France, having decided that he had started too late in the season and, further, that his coal supply was too small for the voyage to the island. The French backers of the enterprise were so discouraged by this outcome of their efforts that they withdrew their support.

The up-hill work that followed need not be detailed here. Nothing but the enthusiasm and indomitable persistence of the two brothers won the day at last. More pamphlets were issued. Special emphasis was placed upon the strong probability that good whaling grounds would be found in the waters around Kerguelen. The Norwegians finally became interested. Money was at last secured to fit out two small French whalers and the Norwegians sent the steamer *Jeanne d'Arc*, of 2,000 tons.

Thus far, the island has been reached twice by the Bossière vessels—in the southern summers of 1908 and 1909. They report Kerguelen, at that season, as glorious to look upon with its snow-crowned mountains towering above valleys deeply carpeted with nutritious grasses supplying the finest of grazing for the livestock that was landed.

Both these expeditions have been in charge of Henri Bossière. His brother, who has been foremost in all the work, has not yet seen the island in which, for 17 years, he has been striving to awaken an interest. In all respects, the two visits to the island have been very encouraging. In 1908, 20 ewes, 2 rams, 3 horses and some hogs were landed on the island. The chief fodder plant, the *Acaena*, was found in great abundance and was greedily eaten by the horses, sheep and hogs. The plant was wide spread, more than knee high, and would give sustenance to many thousands of sheep. When the expedition departed, the 22 sheep and the hogs were left on the island. In the following year, 1909, the sheep were found to have more than doubled. The lambs were strong and as frisky as kids. Most of them were born on the threshold of winter, but they had suffered no ill results from the inclemency of the bad season. Left

on the island without shelter or any provision for their maintenance, the sheep appear to have lived well by browsing on the roots and shrubs which are in great abundance.

Grain pastes had been provided as food for the hogs, but, to a great extent, they neglected this provision to feed on the same nourishing roots. The brothers have faith in this experiment as affording positive proof that stock-raising on the island may be carried on with great success. Why, they ask, should not hundreds of thousands of sheep be raised on Kerguelen with good care when a few of these animals have actually thrived there, through the winter, without care.

The summer conditions, they say, are all right, and the winters are by no means severe. The mean summer temperature is about 45° F., and the mean winter temperature is about 29° F. Mr. René Bossière writes that if the climate of the island is far from being perpetual spring, it may be said somewhat to resemble continuous autumn. The maximum temperature observed by Henri Bossière in the summer of 1908 was 68° F. Two men of the party remained on the island during the winter intervening between the two expeditions. They kept regular temperature records and the lowest temperature observed in the winter months was -17.6° F.

The fishing experiment was a great success. In the first season, 232 whales were captured, all valuable in commerce, and one of them is among the prominent whalebone whales, which were supposed to be extinct in far southern waters. Curiously enough, René Bossière had enlarged in his pamphlets on his theory that the evidence of the extinction of the southern whalebone animals was inconclusive, and he argued that, very likely, they would be rediscovered in the wholly unfished waters around Kerguelen.

A little settlement was made in Royal Bay, on the south side of the island, and here the blubber was conveyed for trying out the oil. This is the first established center of human population on Kerguelen, and it appears on the new maps as Port Jeanne d'Arc. The whaling industry has opened auspiciously and the brothers say that much better will be done in future. They recall that when Captain Larsen reopened the southern whaling industry at South Georgia, a few years ago, he captured only 200 animals in the first season; but the business has now grown to about 1,000 whales a year. Sea elephants and other marine game are also included in the programme of the future industries in Kerguelen waters. It is expected to make Port Jeanne d'Arc the maritime center of the island

and to establish communications with South Africa, which will be the base of supplies.

It has long been known that there is coal in Kerguelen and the brothers published two analyses of this mineral as they have found it in different parts of the island. They say that it burns well in stoves and in the furnaces of their steamers, but its value in the development of the island cannot be estimated until the extent of the coal measures has been ascertained.

Another steamer, the *Espoir*, of 500 tons, left France for the Island in October last. It is proposed to give large attention to the development of animal-growing and, hereafter, to give shelter to the young lambs, if it is found that they would thrive better with such care. The whaling industry promises to be very profitable, and though the Norwegians have been admitted as co-workers, the Bossière brothers have relinquished none of their concessionary rights. The sea elephant was hunted, early in the last century, by hundreds of ships, and, according to the *Challenger Reports*, the animal had almost completely disappeared by 1840. But they are found to-day, in vast numbers, in the waters around Kerguelen and have established their breeding places (they belong to the seal family) on the island. Their skin and blubber are highly valued and the industry is likely to approach that of whale fishing in value. The brothers are sanguine that the raising of sheep, cattle and hogs will be very profitable, express the conviction that Kerguelen will become a prosperous colony and add:

"We may be permitted to hope that, while we are working for ourselves, we may deserve the favorable opinion of our country."

GEOGRAPHICAL RECORD

NORTH AMERICA

STUDY OF AMERICAN DESERT AREAS. The Desert Botanical Laboratory of the Carnegie Institution of Washington is engaged in much work which is of interest to geographers. Under the direction of Dr. D. T. MacDougal it is not only carrying on most important investigations upon the relation of plants to the environment of deserts, but is doing actual exploration and other distinctly geographic work. Some of this work has already been described in articles by Dr. MacDougal upon the Salton Sea, the Desert of Papagueria (*Bull.* Vol. 40, 1908, pp. 705-725), and the Delta of the Colorado (*Bull.* Vol. 39, 1907, pp. 705-729).